

GRADE 12: MATHEMATICS

Benchmark B:

Visualization and Geometric Models

4: Recognize and compare specific shapes and properties in multiple geometries; e.g. plane, spherical, and hyperbolic.

Common Core State Standard for Mathematics » High School: Geometry » Modeling with Geometry

Apply geometric concepts in modeling situations

G-MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

PROCEDURE:

In discussion before viewing *Virtual Reality: Mathematics*, the teacher may consider engaging students in discussion on any of the following topics:

- What they know about virtual reality.
- How geometry might be used in a virtual reality career field.
- If they have any experience with virtual reality, e.g. 3D gaming and/or interactive mathematics or science learning tools.
- How easy/difficult it might be to create 2D and 3D shapes with a computer program.
- Could virtual reality be used as a tool for professional training?

In discussion after viewing *Virtual Reality: Mathematics* the teacher may have a follow-up discussion on the same topics discussed before viewing the video.

BEFORE VIEWING:

Have each student complete the “Before Viewing” column on the Agree-Disagree Chart.

WHILE VIEWING:

Students make notes about their impressions of how mathematics can be used when working with virtual reality software.

AFTER VIEWING:

Have students complete the “After Viewing” column on the Agree-Disagree Chart. Discuss the changes in their answers.

DIRECTIONS:

Mark whether you agree or disagree with each statement in the left column before viewing the video. After viewing the video, identify whether you agree or disagree with each statement in the right column. Discuss each statement as a group.

<i>Before Viewing</i>	<i>Statement</i>	<i>After Viewing</i>
Agree Disagree	In software used to create virtual reality environments, a semi-circle can be rotated around an axis to create a sphere.	Agree Disagree
Agree Disagree	Virtual reality programming with 3D software allows basic shapes, like cubes, to become organic shapes such as flowers.	Agree Disagree
Agree Disagree	In a 3D graph the z-axis extends from the origin of a 2D graph, forming right angles with the x-axis and y-axis.	Agree Disagree

PROCEDURE:

Distribute the pre and post-viewing guide on the following page to provide focused viewing for students while watching the *STEM Career Lab* video, *Virtual Reality: Mathematics*.

Before viewing the video, instruct students to read and respond to the “What I Already Know” column of the *Virtual Reality: Mathematics Viewing Guide*. Let students know it’s okay if they do not know all of the answers. Play the *Virtual Reality: Mathematics* video and instruct students to now fill out the “What I Learned” column. After playing the video, use the guide to facilitate a post-viewing discussion with students.

1. A semi-circle
2. A triangle
3. By adding points, rotating and transforming a cube, you can “sculpt” cubes to form organic shapes.
4. The z-axis shows up as a vertical line; x and y are in the same horizontal plane.
5. Rotating a parabola with the formula $x^2=y$ creates a funnel-like shape.

	<i>What I Already Know</i>	<i>What I Learned</i>
1. What geometric shape could you rotate to create a 3D sphere?		
2. What geometric shape could you rotate to create a 3D cone?		
3. How can basic shapes like cubes be used in 3D software to create organic shapes such as flowers?		
4. In a plot of a 3D graph, where does the z-axis show up?		
5. What kind of a 3D shape could you create if you rotated a hyperbola with the formula $x^2=y$ around the x-axis?		